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ABSTRACT

A program of stimulation, motivation, and cultural enrichment for children in New York City's School District 10 is evaluated in this report. The Bronx Zoological Gardens were used for living laboratory experiences, coordinated with classroom activities in different curriculum areas. Employing zoo visits, lectures, films, and classroom demonstrations, the Living Science Center Program reached over 800 fifth grade students. Effectiveness of the program was evaluated with three instruments: interviews with students, questionnaires to teachers, and observation. Findings from the evaluations are reported under the following topics: (1) project materials and implementation, (2) program observation, (3) personnel evaluation of the program, (4) student reaction to the program, (5) post-program test results, and (6) program coordination and administration. Recommendations for program continuation and improvement are also given. (BL)

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AN EVALUATION OF THE STATE URBAN EDUCATION PROGRAM

"LIVING SCIENCE CENTER"

DISTRICT 10, NEW YORK CITY BOARD OF EDUCATION

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AN EVALUATION OF THE STATE URBAN EDUCATION PROGRAM

"LIVING SCIENCE CENTER"

A. INTRODUCTION

In the Spring of 1969, the Living Science Center Program was initiated with six schools in District 10 and the Bronx Zoo as participants. The program of zoo visits, lectures, films, and classroom demonstrations was recycled for the 1969-70 academic year and involved Public Schools 26, 32, 33, 59, 85 and 91. The participating schools had been identified in the District Plan as those with the greatest need for intensive work in all curriculum areas. Standardized test scores in reading, mathematics, and work-study skills were used to make this determination. Reports of parents, teachers and principals were also used to ascertain the needs of the target population. The fifth grade was selected by the principals of participating schools as the one level that would benefit most from the stimulation, motivation and cultural enrichment this program afforded. Over 800 children participated in the program.

B. OBJECTIVES OF THE PROJECT

The objectives, as formulated in the project proposal, were:

1. to develop the teaching of scientific thought and method through experiences at the Bronx Zoo.

2. to increase learning in related subject areas such as the physical and social sciences, language arts, and other areas through the motivational experience at the Bronx Zoo.

It was felt that the living laboratory experience at the Bronx Zoological Gardens, coordinated with classroom activities in different curriculum areas, would improve motivation and achievement for culturally deprived students who were

not being reached by normal classroom procedures.

C. EVALUATION PROCEDURES

The objectives of the evaluation that was conducted were two-fold:

1. Determination of the extent to which the program was implemented, and

2. Determination of the effectiveness of the program in meeting its stated objectives.

For the purpose of this evaluation, effectiveness of the program was determined by:

1. Observation of the program.

2. An interview sampling children's reactions to the new science program.

3. A questionnaire completed by classroom teachers participating in the program.

To assess the effectiveness of the program, three instruments were employed:

1. Interview with students. A short schedule was used by the evaluation team who interviewed a sampling of 49 children in five schools. The eight main questions of the interviews were designed to determine the attitude of the children toward the program, the effect it had on achievement in science, student ideas about the best and least liked aspects of the program, and how it could be improved.

2. Questionnaire to teachers. A total of 22 classroom teachers and one principal completed a questionnaire designed to determine perception of program goals, degree to which the program affected student learning, interest, and behavior, as well as teacher reaction to the program.

3. Observation. A sample of 21 zoo programs and lessons was observed. In addition, one classroom rehearsal of an original play done by the children was also seen.

D. THE FINDINGS

1. Project Materials and Implementation

The Living Science Center Program involved visits to the Bronx Zoological Park for lectures, films, and tours of the zoo's facilities conducted by special zoo staff, the use of written materials for classroom teachers, and follow-up activities by zoo teachers back in the regular classrooms. Students made six visits to the zoo at intervals of six weeks. The number of visits was reduced from the 11 class visits which were made in the Spring of 1969. The number of students per visit was reduced to 30-60 from the larger groups of 90-120 prevalent in the Spring 1969 semester. Six topics were selected to best fit the fifth grade science curriculum. The included topics were: environmental conservation, biotic zones, animal communication, reproduction, animal coverings, and adaptations to land.

The basic plan of such programs was as follows:

1. The district science coordinator was provided with introductory materials for each of the six lessons by the zoo staff. She then visited each of the participating schools and met with teachers to distribute the literature, provide demonstrations when necessary, and discuss pertinent ideas. The teachers would then introduce basic concepts to the children.

2. Classes visiting the zoo met in the zoo's auditorium where an orientation was given, concepts were reviewed, question and answer periods were held, and students were taken on appropriate tours through the zoo's facilities. At times, the children participated in "animal demonstrations," and were allowed a close view of animal life.

3. The zoo teachers followed up lessons with visits to each classroom bringing animals and other pertinent teaching aids.

4. Classroom teachers followed up each lesson with their own ideas using each zoo experience as a motivation for lessons in science, geography, social

studies, language arts, and other curricular areas.

Many kinds of valuable educational materials were generated by the zoo staff, by classroom teachers, and by the children. Zoo "curriculum guides," encyclopedias, newspapers, vocabulary guides, bibliographies, poetry, experience charts, original stories, dramatic playlets, art displays, and scientific experiments were among the varied and excellent materials and activities which implemented the zoo program.

2. Program Observation

Twenty-two lessons of the Living Science Center Program were observed. All but one of these lessons were presented by zoo teachers either during a zoo visit or as a follow-up activity in the classroom. These lessons were taught as part of the normal run of the program. The one lesson observed which was taught by a regular classroom teacher was that of a rehearsal of a play which was being given by one of the classes participating in the program. In 10 cases, observers rated the interest and enthusiasm of the children as being outstanding. A better than average rating was given in eight cases, while students seemed only moderately interested in four of the 22 lessons observed. In all observations but one, more than half the class actively participated in the lesson. In five of these instances, raters observed that almost every child was actively involved. Student behavior was also rated highly. In eight classes, students behavior was rated as excellent; in an additional eight classes, pupils behavior was rated as good. A rating of "fair" was assigned in the remaining six classes.

Ratings of pupil, teacher, and observer reactions to the observed lessons were generally considered to be good to excellent. Student reaction was rated as excellent in 13 cases and as good in seven cases. Observers noted that students were actively involved in the lessons, were attentive, and asked many questions which generated class discussions. Classroom teacher reaction to the lesson was generally judged as geing good (3) or excellent (14). Teachers showed interest in

the lessons and participated by questioning and by relating the lesson to classroom experiences. In several instances, teacher reaction was not rated at all or was rated as being poor. In these cases, observers noted that the teachers were either not present in their classrooms at the time of the zoo staff lessons, or showed no interest and took no part in the lesson procedure. For the most part, observer reactions to the lessons were either good (5) or excellent (12). Those lessons rated as either fair (1) or poor (1) were regarded as being lectures which were too difficult for the children to follow (Table 1).

TABLE 1

Ratings Assigned by Observers to 22 Zoo Visits and Related Lessons

	Excellent	Good	Fair	Poor	Not Rated
Student interest and enthusiasm	10	8	4	0	0
Student participation	5	16	0	0	1
Student behavior	8	8	6	0	0
Student reaction	13	7	0	0	2
Teacher reaction	14	3	0	1	4
Overall observer reaction	12	5	1	1	3

Observers found that teaching aids were employed in each of the 22 lessons observed. Films, film strips, record players, slides, opaque and overhead projectors were among the audio-visual devices which were used. Although excellent use was made of sophisticated audio-visual equipment, the bringing of live animals to the classrooms was the most unique strategy of the Living Science Center Program. Tactile experiences played a large part in the learning atmosphere for the participating students. For a child to hold a baby opposum not old enough to be out of its mother's pouch and having it suck his finger is a motivational and learning experience which cannot be gained through anything short of a personal encounter. Through this program, inner-city children began to lose their fear of animals and develop a respect for nature, becoming aware of the need for ecological balance and conservation. They also developed an awareness of the world beyond the city.

Children expressed interest in the lessons in many ways. They often questioned instructors about the eating habits of the animals, their reproductive processes, and survival instincts. The enthusiasm of the children was evident. They made comparisons between animals presented and their own pets. Pupils also offered reasons for such diverse phenomenon as why buffalo are almost extinct, what makes birds nervous, and why turtles make no noise. Observers noted that the children seemed most interested in those aspects of the lessons which related to handling live animals and observing natural phenomena first-hand. Students were eager to watch color change occurring in the chameleons as well as in seeing a snake eating a live mouse.

The major strengths of the lessons observed seemed to be threefold, namely, the expertise of the instructors, the well planned and conducted lessons per se, and the bringing of live animals into the classroom. The two weaknesses which observers most frequently noted were: (1) piggy-back scheduling of lectures by the zoo staff which resulted in rushed lessons and (2) lack of classroom teacher involvement and participation in the on-going lessons.

3. Personnel Evaluation of the Program

Twenty-two teachers and one principal completed a questionnaire designed to obtain a reaction to and evaluation of the Living Science Center Program. Their responses indicated that a considerable special training had been given to classroom teachers both prior to and during the run of the program. Fifteen teachers noted that they had attended orientation meetings prior to the beginning of the program. All but two of the 23 respondents noted that they had attended meetings, usually with the district science coordinator, prior to zoo trips. At these meetings the teachers were given an overview of the topic to be covered during that study period. Teachers received printed materials to aid them in constructing unit and lesson plans.

In defining the goals of the program as perceived by the classroom teachers, three main aspects were most frequently noted. Appreciation and interest of children in their common environment with animal life was stated as a program goal by 16 teachers. Fourteen teachers regarded the development of scientific understandings, especially concerning animal life, as a major program goal. The motivational and enrichment aspects of the science program expanding into other curriculum areas was mentioned as a major goal of the program by 14 teachers. Only three teachers noted the development of a scientific approach as a major project objective (Table 2).

TABLE 2

Staff Listing of Program Goals

	Number	Per Cent
Interest and appreciation of environment	16	69.6
Understanding scientific concepts	14	60.9
Enrichment of other subject areas	14	60.9
Development of scientific approach	3	13.0

Teachers seemed to feel that the Living Science Center Program had a favorable effect on student attitude and behavior. In rating pupil enthusiasm for the program, 11 teachers rated student response as outstanding, eight as better than average and three as average. Teachers noted that children looked forward to zoo visits and the change they provided from the regular classroom atmosphere. Three teachers rated classes as being extremely well behaved during the programs. Children were considered to be well behaved by 10 teachers and moderately well behaved by eight other teachers. In rating the degree of pupil participation in the program lessons and tour activities, 13 teachers indicated that almost every child was actively involved while six teachers indicated that more than half the group participated actively (Table 3).

TABLE 3

Teacher Ratings of Student Attitude and Behavior

	Excellent	Good	Fair	Poor	No Reply
Enthusiasm	11	8	3	0	1
Behavior	3	10	8	0	2
Participation	13	6	2	1	1

In describing student response to the science program, 22 teachers noted that student interest in science and other curriculum areas seemed to increase. Related to this increase in student interest was improved academic performance. Twenty teachers stated that the program had increased pupil understanding of scientific concepts. Sixteen teachers noted improvement in children's ability to handle science skills (Table 4).

TABLE 4

Teacher Ratings of Changes in Pupil Interest and Achievement

	Yes	No	No Reply
Did program increase student interest?	22	0	1
Was understanding of scientific concepts improved?	20	3	0
Did children gain in science skills?	16	5	2

When asked to what extent necessary supplies and equipment were available for use, teachers generally noted that although excellent supplies were being used, these supplies were very often delayed in arrival and on several occasions were not received at all. Teachers generally indicated that the program met the needs of the children at least to some extent (nine cases) or, in 10 instances, to a great extent. Where teachers rated the science program as having met children's needs to only a limited extent, they observed that the lectures were too difficult for some chilren to understand. Nonetheless, teachers indicated that, for the most part, children retained abilities and knowledges gained through the program to a great extent (eight) or a least to some estent (10). Several teachers

suggested that the program provide some degree of follow-up in the sixth grade. In most instances, teachers remarked that the program had made their teaching more rewarding (Table 5).

TABLE 5

Staff Ratings of Degree of Program Initiated Effects

	Great extent	Some extent	Limited extent	No extent	No reply
Availability of supplies	2	13	7	0	1
Needs of children met	10	9	4	0	0
Children's degree of retention	8	10	4	0	1
Teaching as more rewarding	6	12	2	2	1

Although teachers generally rated their own and their students' reactions to the program as good to excellent, parental cooperation was not so regarded. Teachers most often noted that parents were not at all involved in the program nor consulted about it. Teachers said that parents were not generally invited to attend zoo trips. However, individual teachers did request parental attendance and found their response to be good or even excellent (Table 6).

TABLE 6

Teacher Ratings of Reactions to the Program

	Excellent	Good	Fair	Poor	None	No Reply
Teacher reaction	10	9	3	0	0	1
Student reaction	10	12	0	0	0	1
Parental reaction	2	3	2	4	12	0

Teachers were asked to designate the greatest strengths of the program. Twelve teachers regarded the opportunity given to children to come into close contact with live animals and to touch them as the program's most important strength. Seven teachers also mentioned that trips to the zoo were a great strength of the program. Teachers believed the program to be a good source of motivational and learning experiences. In describing program weaknesses, nine

teachers mentioned that the time lapse of six weeks between visits was too great and that the time allotted for lectures and tours at the zoo was too limited. Eleven teachers mentioned that overall organization, especially regarding the dissemination of supplies and materials, needed to be improved. Only two teachers stated that the lectures given by the zoo instructors were beyond the children's level of comprehension. The recommendations which teachers made for program improvement generally centered around the deployment of materials to the classes. Thirteen teachers suggested that lesson guides and other materials be given to the classroom teachers in advance of the time trips are to be taken. It was recommended that a common supply closet be used to store materials which teachers could borrow. Four teachers specifically requested that more relevant audio-visual materials be made available to classroom teachers for pre- and post-trip lessons. No teacher felt that the Living Science Center Program should be discontinued, 16 suggested that it be continued with minor modifications, and six throught it could well be continued as is.

4. Student Reaction to the Program

Interviews were conducted with 49 children in five schools which participated in the program. The interviews followed a question-answer format and were designed primarily to ascertain student attitude toward the program and the extent to which it had affected their achievement in science. Forty-one children said that they always enjoyed attending lessons at the zoo. The remaining eight students said that they sometimes enjoyed their zoo visits. When asked what the liked best about the program, pupil responses tended to fall into one of two categories. Twenty children said that they enjoyed the program because of everything they had learned. An additional 20 said that the best part was getting a chance to see the animals up close and being able to touch them. Many children said they liked "getting to see the real thing" and "being near the animals." Only four students mentioned that the lectures were too difficult for them to understand. Two

children complained that they did not like the fact that many animals were in danger and were "having a hard time trying to live."

Few of the children advanced suggestions concerning program improvements. Nine students suggested that trips be taken more often. Five pupils thought that each trip should be longer, and four recommended that the program be expanded to include all grades rather than only fifth graders.

Of the 49 children interviewed, 43 said that they enjoyed doing science more under the new program. Three children said that it made no difference to them and three said that they did not like science at all. Beyond the factor of enjoying science more under the Living Science Center Program, 42 children reported that science tests seemed easier to them than they had previously been and a total of 43 students said that their science grades had improved since the preceding term. All 49 children said they would like to see the lessons continued next year.

5. Post-Program Test Results

A 40 item objective test was given to the fifth grade students who participated in the science program and two classes of control students who had not. The test consisted of 22 true-false items and 18 multiple-choice items covering the six topics dealt with through the program. Table 7 shows the breakdown of test scores for the schools involved. Although an eight point difference in mean scores was found between the experimental and control groups, this difference was not statistically significant. However, it should be noted that the two classes used as a control group were, for the most part, homogeneously grouped at the upper levels of reading ability for the control school. Thus, it is somewhat invalid to compare these two top classes with the total fifth grade population of the schools that participated in the program.

TABLE 7

Post-Program Test Results

School	Number	Mean Score
26	149	75
32	149	68
33	103	77
59	119	66
85	114	57
91	124	74
Total Experimental Group	758	70
Control class 1	28	64
Control class 2	23	60
Total control group	51	62

6. Program Coordination and Administration

The evaluation team found the Living Science Center Program to be basically well-organized and effectively run. Training sessions for classroom teachers were carried on and overall program implementation was good. Teachers noted that there was a need for improving the logistics involved in transportation of children as well as in the on-time distribution of materials for class use. However, the overall administrative set-up of the program was laudable.

E. RECOMMENDATIONS

The organization and implementation of the Living Science Center Program was worthwhile both in terms of its stated goals and overall benefit to the children involved. Trips and classroom visits by zoo personnel were enthusiastic ventures used for gaining knowledge, understanding, and experience. The evaluation team supports not only the continuance of the program, but indeed an expansion of it. The following recommendations are made in the hope that they may be used to improve an already valuable program.

1. Make better provision for supplying teachers with the equipment needed for an increased number of science experiments.

2. Establish a district-wide source of such audio-visual materials as films, filmstrips, transparencies, tapes, records and slides.

3. Provide for the "borrowing" of animals for classroom observation and instructional purposes over an extended time period.

4. Increase length of time for each zoo visit.

5. Develop parental awareness of the program and participation in trips.

6. Provide for a follow-up program in grade six where feasible.